

Federal Communications Commission Washington, D.C. 20554

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SMALL ENTITY COMPLIANCE GUIDE

Authorizing Permissive Use of the "Next Generation" Broadcast Television Standard"

FCC 17-158 GN Docket No. 16-142 Released: November 20, 2017

This Guide is prepared in accordance with the requirements of Section 212 of the Small Business Regulatory Enforcement Fairness Act of 1996. It is intended to help small entities—small businesses, small organizations (non-profits), and small governmental jurisdictions—comply with the revised rules adopted in the above-referenced Federal Communications Commission (FCC or Commission) rulemaking dockets. This Guide is not intended to replace or supersede these rules, but to facilitate compliance with the rules. Although we have attempted to cover all parts of the rules that might be especially important to small entities, the coverage may not be exhaustive. This Guide cannot anticipate all situations in which the rules apply. Furthermore, the Commission retains the discretion to adopt case-by-case approaches, where appropriate, that may differ from this Guide. Any decision regarding a particular small entity will be based on the statute and any relevant rules.

In any civil or administrative action against a small entity for a violation of rules, the content of the Small Entity Compliance Guide may be considered as evidence of the reasonableness or appropriateness of proposed fines, penalties or damages. Interested parties are free to file comments regarding this Guide and the appropriateness of its application to a particular situation. The FCC will then consider whether the recommendations or interpretations in the Guide are appropriate in that situation. The FCC may decide to revise this Guide without public notice to reflect changes in the FCC's approach to implementing a rule, or it may clarify or update the text of the Guide. Direct your comments and recommendations, or calls for further assistance, to the FCC's Consumer Center:

1-888-CALL-FCC (1-888-225-5322) TTY: 1-888-TELL-FCC (1-888-835-5322) Videophone: 1-844-4-FCC-ASL (1-844-432-2275) Fax: 1-866-418-0232

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I. OBJECTIVES OF THE PROCEEDING

In the *Next Gen TV Report and Order*, the FCC sets rules that will allow digital television (DTV) broadcasters to provide "Next Generation" broadcast television (Next Gen TV) service, also called "ATSC 3.0" or "3.0," on a voluntary, market-driven basis. Full power and Class A DTV broadcasters that choose to deploy ATSC 3.0 service must also continue to deliver current-generation DTV service, also called "ATSC 1.0" or "1.0," to their viewers. The requirement to continue to provide ATSC 1.0 service is called "local simulcasting."

ATSC 3.0 is the new television transmission standard developed by Advanced Television Systems Committee as the world's first Internet Protocol (IP)-based broadcast transmission platform. It combines the capabilities of over-the-air (OTA) broadcasting with the broadband viewing and information delivery methods of the Internet, using the same 6 MHz channels presently allocated for DTV service.

ATSC 3.0 technology gives Next Gen TV broadcasters the potential to provide consumers with more vivid pictures and sound – including Ultra High Definition (UHD) television, superior reception, mobile viewing capabilities, enhanced public safety capabilities, enhanced accessibility features, localized and/or personalized content, and interactive educational children's content.

In summary, the *Next Gen TV Report and Order*, among other things:

- Allows DTV broadcasters to deploy Next Gen TV service on a voluntary basis.
- Requires Next Gen TV broadcasters to partner with another local station in its market to simulcast their programming in the current DTV transmission standard, so that viewers can continue to receive their existing broadcast TV service.
- Requires that Next Gen TV station's 1.0 or 3.0 "guest" channel aired on a partner host station be licensed as a temporary second channel of the Next Gen TV (originating) station. (That is, the ATSC 1.0 and ATSC 3.0 signals of a Next Gen TV broadcaster will be two separately authorized companion channels under the broadcaster's single, unified license.) A Next Gen TV broadcaster must file an application and obtain FCC approval before it may begin ATSC 3.0 service or ATSC 1.0 simulcast service as a guest on a partner (1.0 host) station.
- Requires the programming aired on the ATSC 1.0 simulcast channel to be "substantially similar" to the programming aired on the 3.0 channel. This means that the programming must be the same, except for programming features that are based on the enhanced capabilities of ATSC 3.0, advertisements and promotions. This requirement applies to the Next Gen TV station's primary channel.
- Exempts low power TV (LPTV) and TV translator stations from the local simulcasting requirement, and permits case-by-case waivers for full-power and Class A stations if a station has no "viable" local simulcasting partner in its market and makes "reasonable efforts" to preserve existing 1.0 service to viewers in its community of license and/or otherwise minimize the impact on such viewers (for example, by providing free or low cost ATSC 3.0 converters to viewers).
- Retains mandatory carriage rights on cable and satellite systems for simulcast (ATSC 1.0) signals and gives no mandatory carriage rights to Next Gen TV (ATSC 3.0) signals.
- Subjects Next Gen TV signals to the public interest obligations that currently apply to DTV broadcasters.
- Requires DTV broadcasters to provide advance on-air notifications to educate consumers about Next Gen TV service deployment and simulcasting.
- Incorporates specific parts of the Next Gen TV technical standard (A/321 and A/322) into the FCC's rules and explains the methodology used to calculate interference.

 Concludes that it is unnecessary at this time to adopt a Next Gen TV tuner mandate for new television receivers.

In conclusion, the *Next Gen TV Report and Order* will allow DTV broadcasters to begin operating in ATSC 3.0 on a voluntary basis. The *Report and Order* facilitates innovation in the television broadcast industry.

II. COMPLIANCE REQUIREMENTS

The Next Gen TV Report and Order allows, but does not require, DTV broadcasters to deploy Next Gen TV/ATSC 3.0 service and adopts new rules for Next Gen TV broadcasters that choose to deploy such service.

• Providing Next Gen TV/ATSC 3.0 service is voluntary and there are no requirements imposed on DTV broadcasters that do not choose to provide such service.

Next Gen TV Broadcasting/Stations; 47 CFR § 73.624(b)(3)

- Next Gen TV service is optional, at the discretion of the DTV broadcaster. A Next Gen TV station is a DTV station that chooses to deploy Next Gen TV service.
- Next Gen TV stations must transmit at least one free over the air video programming stream on their ATSC 3.0 signal. A Next Gen TV station that converts to ATSC 3.0 operation on its existing facility must provide service to the station's DTV noise-limited service contour (NLSC).
- A Next Gen TV station (except for a LPTV or TV translator station) must also simulcast the
 primary video programming stream aired on its ATSC 3.0 channel by broadcasting an ATSC 1.0
 simulcast channel from another broadcast television facility within its local market (in accordance
 with the local simulcasting requirement in 47 CFR §§73.3801, 73.6029 or 74.782).

Next Gen TV Broadcast Television Transmission Standard; 47 CFR §§ 73.682(f) and 73.8000

- Under the new rules, DTV broadcasters are now allowed, but not required, to use Next Gen TV/ATSC 3.0 as an optional broadcast television transmission standard.
 - That is, DTV broadcasters may now broadcast their signal in the new ATSC 3.0 format, provided they comply with the local simulcasting requirement in 47 CFR §§73.3801, 73.6029 or 74.782 (described below), or they may continue to broadcast their signal only in their current ATSC 1.0 format.
- Next Gen TV broadcasters must comply with the following ATSC 3.0 standards:
 - 1. ATSC A/321:2016, "System Discovery and Signaling" (March 23, 2016); and
 - 2. ATSC A/322:2017 "Physical Layer Protocol" (June 6, 2017), until February 2, 2023, and only with respect to the transmission of at least one free over the air primary video programming stream.

Next Gen TV Station Interference Protection; 47 CFR § 73.616(g)

- The interference protection requirements that apply to DTV station operations also applies to Next Gen TV station operations. The new rules will maintain the status quo for interference protection and allow the FCC to calculate the coverage areas of ATSC 3.0 stations with certainty.
 - The existing DTV methodology and planning factors (specified in 47 CFR §§73.622, 73.624 and 74.703) will be used to calculate how ATSC 3.0 signals will interfere with ATSC 1.0 signals.
 - o The same DTV methodology and planning factors will be used to define the service area of an ATSC 3.0 signal and to define the ATSC 3.0 interference criteria for co- and adjacent channel interfering signals at the same levels as specified in OET Bulletin No. 69 for DTV signals.¹
 - Next Gen TV stations must offer at least one free ATSC 3.0 video programming stream comparable to a DTV signal and must provide a signal with a chosen modulation/coding scheme that requires a signal-to-noise-ratio/SNR threshold of no more than would be required of a DTV signal. This requirement will preserve service to existing OTA viewers, all else being equal (*i.e.*, an ATSC 3.0 transmission from the same antenna, location, and power level, received by equipment with the same performance as a DTV transmission will cover the same area as a comparable DTV signal).
 - The methodology and planning factors defined in OET Bulletin No. 69 will be used to define an ATSC 3.0 "DTV-equivalent" service area in which the ATSC 3.0 signal is protected from interference.
 - ATSC 3.0 signals will be protected from co-channel and adjacent channel interference as defined in OET Bulletin No. 69.

Mandatory Cable and Satellite Carriage of Next Gen TV Signals (ATSC 3.0 and 1.0); 47 CFR §§ 76.56(h), 76.66(o)

- A Next Gen TV broadcaster may assert cable or satellite mandatory carriage rights only with respect to its ATSC 1.0 signal and may not assert mandatory carriage rights with respect to its ATSC 3.0 signal.
- With respect to a Next Gen TV station that moves its 1.0 simulcast signal to a host station's (*i.e.*, a station whose facilities are being used to transmit programming originated by another station) facilities, the station may assert mandatory carriage rights only if it (1) qualified for, and has been exercising, mandatory carriage rights at its original location and (2) continues to qualify for mandatory carriage at the host station's facilities, including (but not limited to) delivering a good quality 1.0 signal to the cable system principal headend or the satellite carrier local receive facility, or agreeing to be responsible for the costs of delivering such 1.0 signal to the cable system or to the satellite carrier.

¹ The FCC's OET Bulletin No. 69 provides guidance on the implementation and use of Longley-Rice methodology for evaluating TV service coverage and interference in accordance with Sections 73.622, 73.623 and 74.704 of the FCC rules; *see* https://www.fcc.gov/general/oet-bulletins-line#69.

Local Simulcasting; 47 C.F.R. §§ 73.3801 (full-power TV), 73.6029 (Class A TV), and 74.782 (low-power TV)

- Entities subject to local simulcasting rule: Full-power commercial and noncommercial educational (NCE) stations and Class A stations that choose to deploy Next Gen TV service must simulcast in ATSC 1.0 format (in accordance with the local simulcasting requirements). Low-power and TV translator Next Gen TV stations are not required to simulcast in ATSC 1.0 format, but if they choose to do so, then they must comply with the local simulcasting requirements.
- Simulcasting Arrangements: The rules allow all television station classes to participate together in simulcast arrangements. A full power station may partner with one or more other full power stations or with one or more Class A, LPTV, or TV translator stations. In addition, NCE stations may partner with commercial stations.
 - o A Next Gen TV broadcaster that airs its ATSC 1.0 or ATSC 3.0 "guest" signal on a partner "host" station must operate that signal using the technical facilities of the host, but is responsible for the broadcast of such signal.
 - For example, a Class A, LPTV, or TV translator station airing a 1.0 or 3.0 signal on a full power host station will necessarily operate its 1.0 or 3.0 "guest" signal using the technical facilities of the full power station, including the higher power limit specified in Part 73 of the rules.
 - Conversely, a full power station airing a 1.0 or 3.0 signal on a Class A, LPTV, or TV translator station must operate that signal at the Class A, LPTV, or TV translator's lower Part 74 power level.
 - Next Gen TV stations airing a 1.0 or 3.0 guest signal on a partner host station will be licensed for such use under its own license (as opposed to the host) and will continue to be obligated to comply with the programming and other operational obligations of the station originating the guest signal (rather than those of the partner host station).
 - Host/Guest Definitions:
 - A "host" station is the station whose facilities are being used to transmit programming originated by another station ("guest").
 - A "guest" station is the station that is licensed to use another station's facilities ("host") to transmit its programming.
 - For example, in a reciprocal simulcasting arrangement between Station A and Station B in which Station A will convert to, and operate in, ATSC 3.0 format and Station B will continue to operate in ATSC 1.0 format, Station A will be the 3.0 host for Station B's guest 3.0 signal and Station B will be the 1.0 host for Station A's guest 1.0 simulcast signal.
 - DTV stations cannot broadcast in both ATSC 3.0 and ATSC 1.0 from the same facility, which is why broadcasters need to partner with other stations in the market in order to broadcast in both transmission standards.
- Simulcasting Requirement: A full power or Class A TV station that chooses to air an ATSC 3.0 signal must simulcast the primary video programming stream of that signal in an ATSC 1.0 format. An LPTV or TV translator station that chooses voluntarily to simulcast must simulcast the primary video programming stream of their ATSC 3.0 signal in an ATSC 1.0 format. The simulcast requirement does not apply to any multicast streams aired on the ATSC 3.0 channel.
- "Substantially Similar" Requirement: The programming aired on the ATSC 1.0 simulcast signal must be "substantially similar" to that aired on the ATSC 3.0 primary video programming stream. In this context, "substantially similar" means that the programming must be the same except for advertisements, promotions for upcoming programs, and programming features that are based on

the enhanced capabilities of ATSC 3.0.

- o These enhanced capabilities include:
 - (i) hyper-localized content (<u>e.g.</u>, geo-targeted weather, targeted emergency alerts, and hyper-local news):
 - (ii) programming features or improvements created for the ATSC 3.0 service (e.g., emergency alert "wake up" ability and interactive program features);
 - (iii) enhanced formats made possible by ATSC 3.0 technology (<u>e.g.</u>, 4K or HDR); and
 - (iv) personalization of programming performed by the viewer and at the viewer's discretion.
- Programming that airs at a different time on the ATSC 1.0 simulcast signal than on the primary video programming stream of the ATSC 3.0 signal is not considered "substantially similar."
- Coverage Requirements for the ATSC 1.0 Simulcast Signal: Next Gen TV stations that convert their existing facilities to ATSC 3.0 format and move their ATSC 1.0 simulcast signal to a partner host station must select a host station that will allow it to satisfy the following coverage requirements to minimize 1.0 service loss to existing viewers.
 - All 1.0 guest stations must select a host station that is assigned to the same Designated Market Area (DMA).
 - Full power TV 1.0 guest stations must retain and continue to provide 1.0 service to its existing community of license and comply with the Commission's community of license signal requirement (47 CFR 73.625).
 - O Class A TV, LPTV and TV translator 1.0 guest stations must maintain overlap between the protected contour (47 CFR 73.6010(c)) of its existing signal and its ATSC 1.0 simulcast signal; and (2) may not move its ATSC 1.0 simulcast signal more than 30 miles from the reference coordinates of its original antenna location.
- In addition, in evaluating license applications, the Commission will consider any loss in signal coverage resulting from the simulcast arrangement in determining whether to grant the application. The Commission will consider more favorably simulcast arrangements with a service loss of no more than five percent of the population served by the.
- Coverage Requirements for ATSC 3.0 Signals: Next Gen TV stations that choose to continue broadcasting in ATSC 1.0 on its existing facilities and transmit an ATSC 3.0 signal (as a guest) on the facilities of a host station must select a host station that is assigned to the same DMA.
- Licensing of Next Gen TV Stations: Next Gen TV stations must obtain Commission approval to modify its license for authority to convert its existing facility to ATSC 3.0 operations, operate a guest 1.0 simulcast channel on a host station or to operate a guest 3.0 channel on a host station.
 - Each station participating in a simulcasting arrangement will continue to be licensed and operated separately, have its own call sign, and be separately subject to all applicable Commission obligations, rules, and policies.
 - o ATSC 1.0 and ATSC 3.0 signals aired on the facilities of a host station will be licensed as temporary second channels of the originating station. (Each licensee remains responsible for its own signal. The host will be licensed for its signal(s) aired on its channel and the guest will be licensed for its signal(s) aired using the host's channel.)
 - The Commission will include a note on the originating station's license identifying any ATSC 1.0 or ATSC 3.0 signal being aired on the facilities of a host station. The Commission will also include a note on a host station's license identifying any ATSC 1.0 or ATSC 3.0 guest signal(s) being aired on the facilities of the host station.
 - o For more information, see Reporting Requirements in next section of the Guide.

III. RECORDKEEPING AND REPORTING REQUIREMENTS

The Next Gen TV Report and Order contains new information collection requirements.

License Application to FCC Required / FCC Form 2100 (Reporting Requirement; 47 CFR 73.3801(f), 73.6029(f), and 74.782(g)):

- A broadcaster must file an application (FCC Form 2100) with the Commission, and receive Commission approval, before:
 - (1) Moving its ATSC 1.0 signal to the facilities of a host station, moving that signal from the facilities of an existing host station to the facilities of a different host station, or discontinuing an ATSC 1.0 guest signal;
 - (2) Commencing the airing of an ATSC 3.0 signal on the facilities of a host station (that has already converted to ATSC 3.0 operation), moving its ATSC 3.0 signal to the facilities of a different host station, or discontinuing an ATSC 3.0 guest signal; or
 - (3) Converting its existing station to transmit an ATSC 3.0 signal or converting the station from ATSC 3.0 back to ATSC 1.0 transmissions.
 - o FCC Form 2100: The Media Bureau will be amending FCC Form 2100 and the relevant schedules (Schedules B, D & F)² as necessary to implement the Next Gen TV licensing process and collect the required information. The form will be revised to establish the streamlined "one-step" licensing process for Next Gen TV applicants. As of March 2018, the form is not currently available for filing.
 - Streamlined Process: A broadcaster may file only an application for modification of license, provided no other changes are being requested in such application that would require the filing of an application for a construction permit as otherwise required by the rules.
 - Expedited Processing. An application filed in accordance with the streamlined process will
 receive expedited processing provided, for stations requesting to air an ATSC 1.0 signal on
 the facilities of a host station, the station will provide ATSC 1.0 service to at least 95 percent
 of the predicted population within the noise limited service contour of its original ATSC 1.0
 facility.
 - o Required Information: An application must include the following information:
 - (A) the station serving as the host, if applicable,
 - (B) the technical facilities of the host station, if applicable,
 - (C) the DMA of the originating broadcaster's facility and the DMA of the host station, if applicable, and
 - (D) any other information deemed necessary by the Commission to process the application.
 - o If an application includes a request to air an ATSC 1.0 signal on the facilities of a host station, the broadcaster must also indicate on the application (in addition to other required information):
 - (A) the predicted population within the noise limited service contour served by the station's original ATSC 1.0 signal,
 - (B) the predicted population within the noise limited service contour served by the station's original ATSC 1.0 signal that will lose the station's ATSC 1.0 service as a result of the simulcasting arrangement, including identifying areas of service loss by providing a contour overlap map, and
 - (C) whether the ATSC 1.0 simulcast signal aired on the host station will serve at least 95 percent of the population.

² Schedule B – Full Power License to cover application; Schedule D – LPTV/Translator License to cover application; and Schedule F – Class A License to cover application.

- o If an application includes a request to air an ATSC 1.0 signal on the facilities of a host station and does not meet the 95 percent standard for expedited processing, the application must contain the following information (in addition to other required information):
 - (A) whether there is another possible host station(s) in the market that would result in less service loss to existing viewers and, if so, why the Next Gen TV broadcaster chose to partner with a host station creating a larger service loss;
 - (B) what steps, if any, the station plans to take to minimize the impact of the service loss (e.g., providing ATSC 3.0 dongles, set-top boxes, or gateway devices to viewers in the loss area); and
 - (C) the public interest benefits of the simulcasting arrangement and a showing of why the benefit(s) of granting the application would outweigh the harm(s). These applications will be considered on a case-by-case basis.

<u>Next Gen TV Station On-Air Notices to Consumers (Third-Party Disclosure Requirement; 47 C.F.R. §§ 73.3801(g), 73.6029(g), and 74.782(h))</u>:

- Commercial and noncommercial educational (NCE) broadcast TV stations that relocate their ATSC 1.0 signals (e.g., moving to a host station's facility, subsequently moving to a different host, or returning to its original facility) are required to air daily Public Service Announcements (PSAs) or crawls³ every day for 30 days prior to the date that the stations will relocate/terminate ATSC 1.0 operations on their existing facilities.
 - o Stations that transition directly to ATSC 3.0 will be required to air daily PSAs or crawls every day for 30 days prior to the date that the stations will terminate ATSC 1.0 operations.
 - Broadcaster on-air notices to consumers will be used to inform consumers if stations they
 watch will be changing channels and encouraged to rescan their receivers for new channel
 assignments.

<u>Next Gen TV Broadcaster Written Notices to MVPDs (Third-Party Disclosure Requirement; 47 C.F.R. §§</u> 73.3801(h), 73.6029(h), and 74.782(i)):

- Next Gen TV stations relocating their ATSC 1.0 signals (e.g., moving to a temporary host station's facility, subsequently moving to a different host, or returning to its original facility) must provide notice to MVPDs that: (1) No longer will be required to carry the station's ATSC 1.0 signal due to the relocation; or (2) carry and will continue to be obligated to carry the station's ATSC 1.0 signal from the new location.
 - o *Content.* The notice must contain the following information:
 - (1) Date and time of any ATSC 1.0 channel changes;
 - (2) The ATSC 1.0 channel occupied by the station before and after commencement of local simulcasting;
 - (3) Modification, if any, to antenna position, location, or power levels;
 - (4) Stream identification information; and
 - (5) Engineering staff contact information.
 - o *Amended Notice*. If any of the information provided in the Required Notice changes, then an amended notification must be sent.
 - o Timing. Next Gen TV stations must provide notice: (i) at least 120 days in advance of relocating their ATSC 1.0 signals if the relocation occurs during the post-incentive auction transition period; or (ii) at least 90 days in advance of relocating their ATSC 1.0 signals if the relocation occurs after the post-incentive auction transition period (see 47 CFR 27.4). If the anticipated date of the ATSC 1.0 signal relocation changes, the station must send a further notice to affected MVPDs informing them of the new anticipated date.

³ Crawls are text that advance very slowly across the bottom of the screen during a TV program.

- Method. Next Gen TV stations may choose whether to provide notice as required by this section either by a letter notification or electronically via email if the relevant MVPD agrees to receive such notices by email.
 - Letter notifications to MVPDs must be sent by certified mail, return receipt requested to the MVPD's address in the FCC's Online Public Inspection File (OPIF), if the MVPD has an online file.
 - For cable systems that do not have an online file, notices must be sent to the
 cable system's official address of record provided in the system's most
 recent filing in the FCC's Cable Operations and Licensing System
 (COALS).
 - For MVPDs with no official address in OPIF or COALS, the letter must be sent to the MVPD's official corporate address registered with their State of incorporation.

• <u>Local Simulcasting Agreements (Recordkeeping Requirement; 47 C.F.R. §§ 73.3801(e), 73.6029(e), and 74.782(f))</u>:

- Broadcasters must maintain a written copy of any local simulcasting agreement and provide it to the Commission upon request.
- o *Agreement Content*: Local simulcasting agreements must contain provisions outlining each licensee's rights and responsibilities regarding:
 - (i) Access to facilities, including whether each licensee will have unrestrained access to the host station's transmission facilities;
 - (ii) Allocation of bandwidth within the host station's channel;
 - (iii) Operation, maintenance, repair, and modification of facilities, including a list of all relevant equipment, a description of each party's financial obligations, and any relevant notice provisions;
 - (iv) Conditions under which the simulcast agreement may be terminated, assigned or transferred; and
 - (v) How a guest station's (i.e., a station originating programming that is being transmitted using the facilities of another station) signal may be transitioned off the host station.

IV. IMPLEMENTATION DATE

- The following rules in the *Next Gen TV Report and Order* are effective on March 5, 2018: 47 CFR 15.117(b), 73.616(e) and (g), 73.624(b), 73.626(g), 73.682(f), 73.8000(b), 76.56(h) and 73.66(o).
- The following rules in the Next Gen TV Report and Order require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act: 47 CFR 73.3801, 73.6029, and 74.782. These rules will become effective after the Commission publishes a notice in the Federal Register announcing OMB approval and the relevant effective date.

V. INTERNET LINKS

- A copy of the Next Gen TV Order (FCC 17-158), is available at:
 - o https://apps.fcc.gov/edocs_public/attachmatch/DA-17-158A1.pdf.
- A copy of the Federal Register Summary of the Next Gen TV Order is available at:
 - o https://www.gpo.gov/fdsys/pkg/FR-2018-02-02/pdf/2018-01473.pdf.

- A copy of the two ATSC 3.0 standards of the Advanced Television Systems Committee (ATSC) incorporated by reference into the FCC's rules by the Next Gen TV Order are available as follows:
 - (1) ATSC A/321:2016 "System Discovery & Signaling" (A/321) is available at https://www.atsc.org/wp-content/uploads/2016/03/A321-2016-System-Discovery-and-Signaling-3.pdf; and
 - (2) A/322:2017 "Physical Layer Protocol" (A/322) is available at https://www.atsc.org/wp-content/uploads/2016/10/A322-2017a-Physical-Layer-Protocol-1.pdf.